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CAST and after-CAST

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CAST is astroparticle physics experiment of CERN since 1999, searching mainly for axions. Without having observed as yet this theoretically postulated particle, CAST have further narrowed the phase space for the axion. Today, it is reasonable to say that the rest mass of this tiny particle is probably in the sub-meV range. Following a suggestion (with other 8 colleagues from 7 affiliations) from 2011, the CAST collaboration has converted CAST from an axion helioscope to an axion haloscope, searching for dark matter (DM) axions. The first results were published in 2022 (Nature communications), being competitive with a reference experiment running since ~2 decades. The axion search was the main activity in CAST. In parallel, we had expanded CAST's horizon searching also for solar chameleons, particles from the dark energy sector. The data analysis in 2023-2024 is aiming to complete the search for streaming DM axions, which imply eventually a better detection sensitivity. The CAST performance was optimized thanks to its people and using state-of-the-art equipment like: recycled XR Telescope(s), microMEGAS, solid state detectors, force sensors and also the magnet recycled from the LHC RD. The motivation to discover axions remains strong; the emerging new detection concepts are impressive (see also contribution to this conference by Abaz Kryemadhi/ Messiah University, USA). The gained experience with CAST allows to address the biggest questions of our time, which seem to be associated with insisting puzzling anomalies also within the solar system. Zwicky's intriguing observation of "dunkle Materie" is suggestive.

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